A Review of Offshore Marine Habitats, Resources, and Issues in South Carolina

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South Carolina Coastal Resources

Bottom Habitat Types and Uses

- Physical Resource
- Biological Resources

State versus Federal Shelf Waters

Management Issues and Research Needs

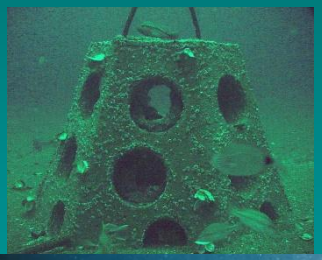
Existing Survey Data

New Mapping Effort through SC Energy Office

South Carolina's Ocean Bottom Habitats

Sandy Soft Bottom (majority)

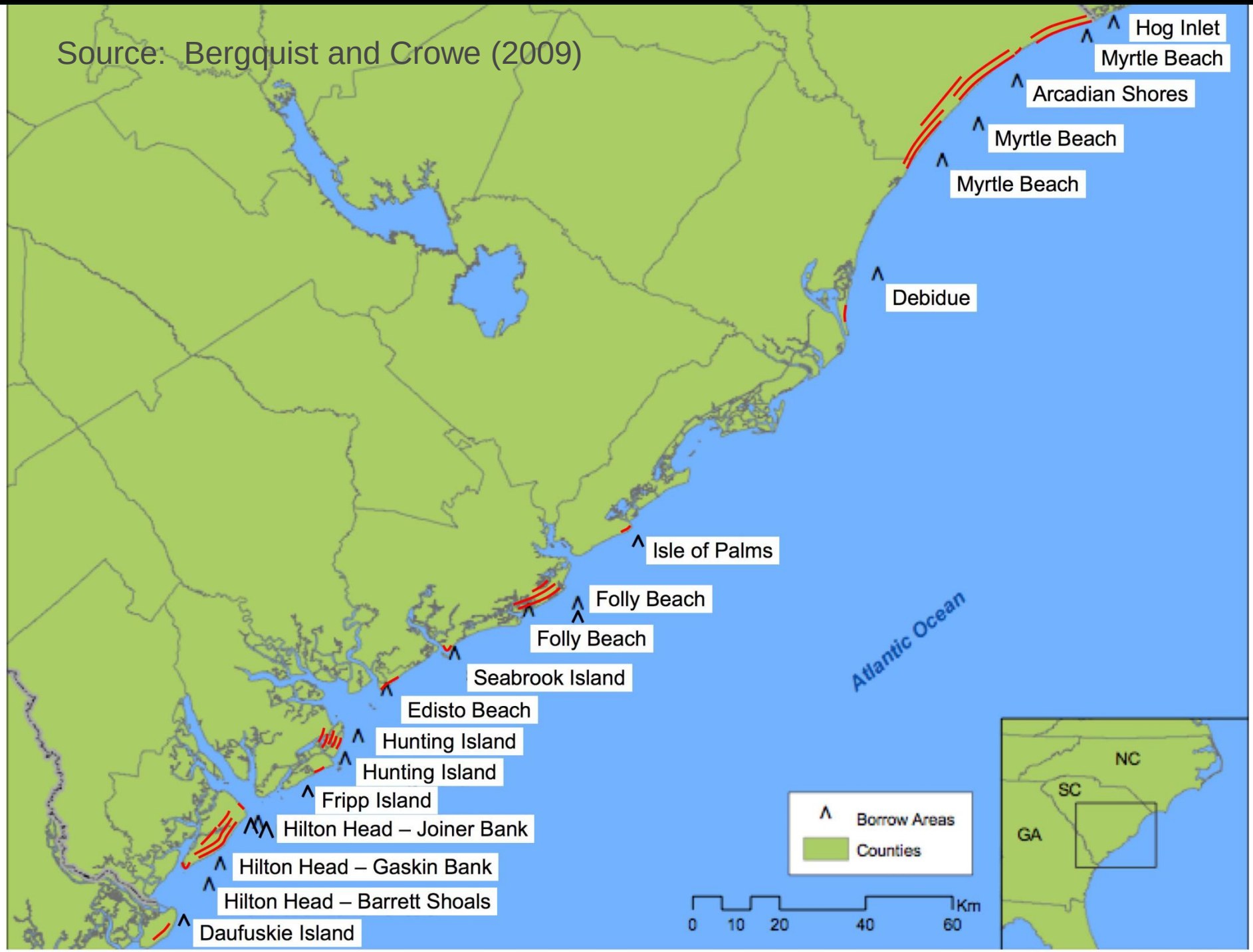
Natural Hard Bottom Reef Habitat



Artificial Reefs

Sand Bottom Uses

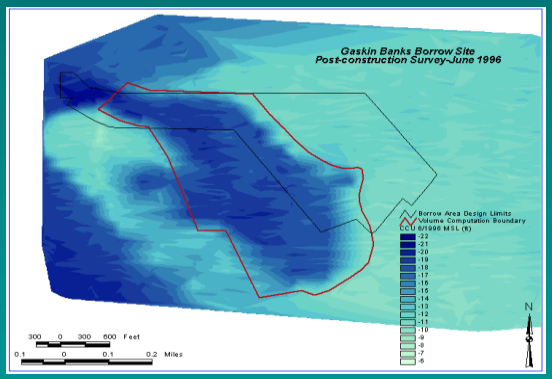
Beach Erosion and Nourishment

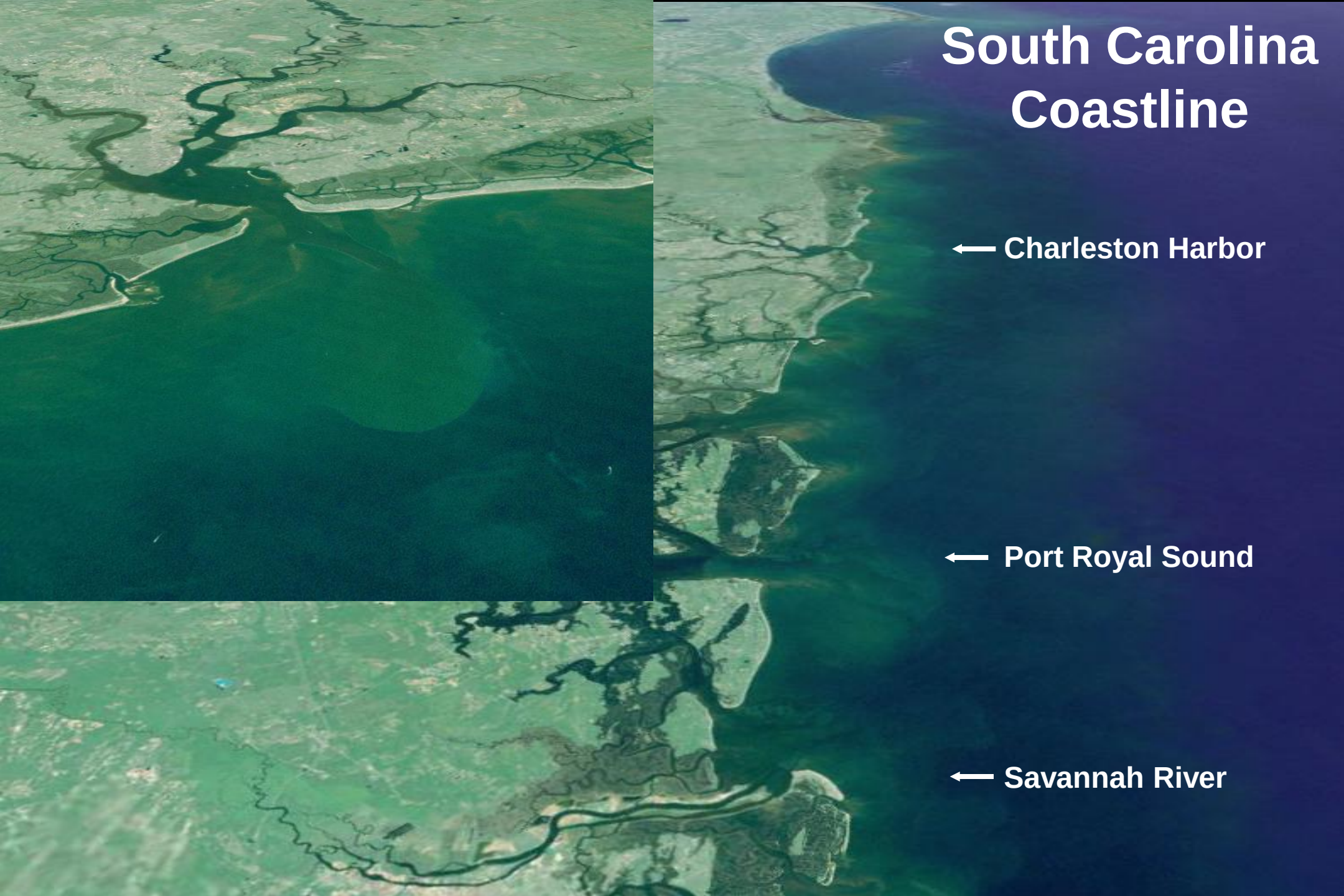

Source: Bergquist and Crowe (2009)
Hog Inlet
Myrtle Beach
Arcadian Shores
Myrtle Beach
Myrtle Beach
Debidue
Isle of Palms
Folly Beach
Folly Beach
Seabrook Island
Edisto Beach
Hunting Island
Hunting Island
Fripp Island
Hilton Head – Joiner Bank
Hilton Head – Gaskin Bank
Hilton Head – Barrett Shoals
Daufuskie Island
Atlantic Ocean
Borrow Areas
Counties
0 10 20 40 60 Km
NC
SC
GA

Beach and Nearshore Zone

Beach Nourishment Study Findings:

- Sand “borrow” sites have greater and long-term effects
  - Long-term changes in the benthos
  - Often slow to fill, accumulate fines
  - Require dredging multiple sites if slow or no recovery
  - May require dredging to shallower depths below grade




South Carolina Coastline
Charleston Harbor
Port Royal Sound
Savannah River

Beach and Nearshore Zone

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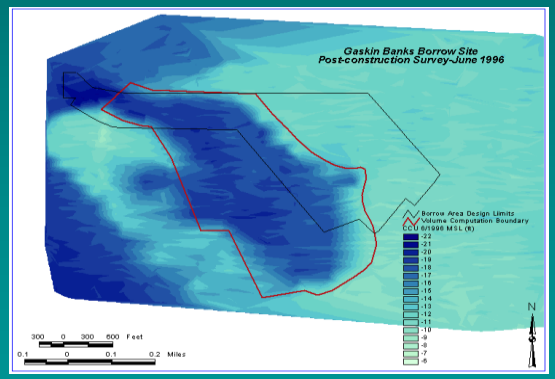
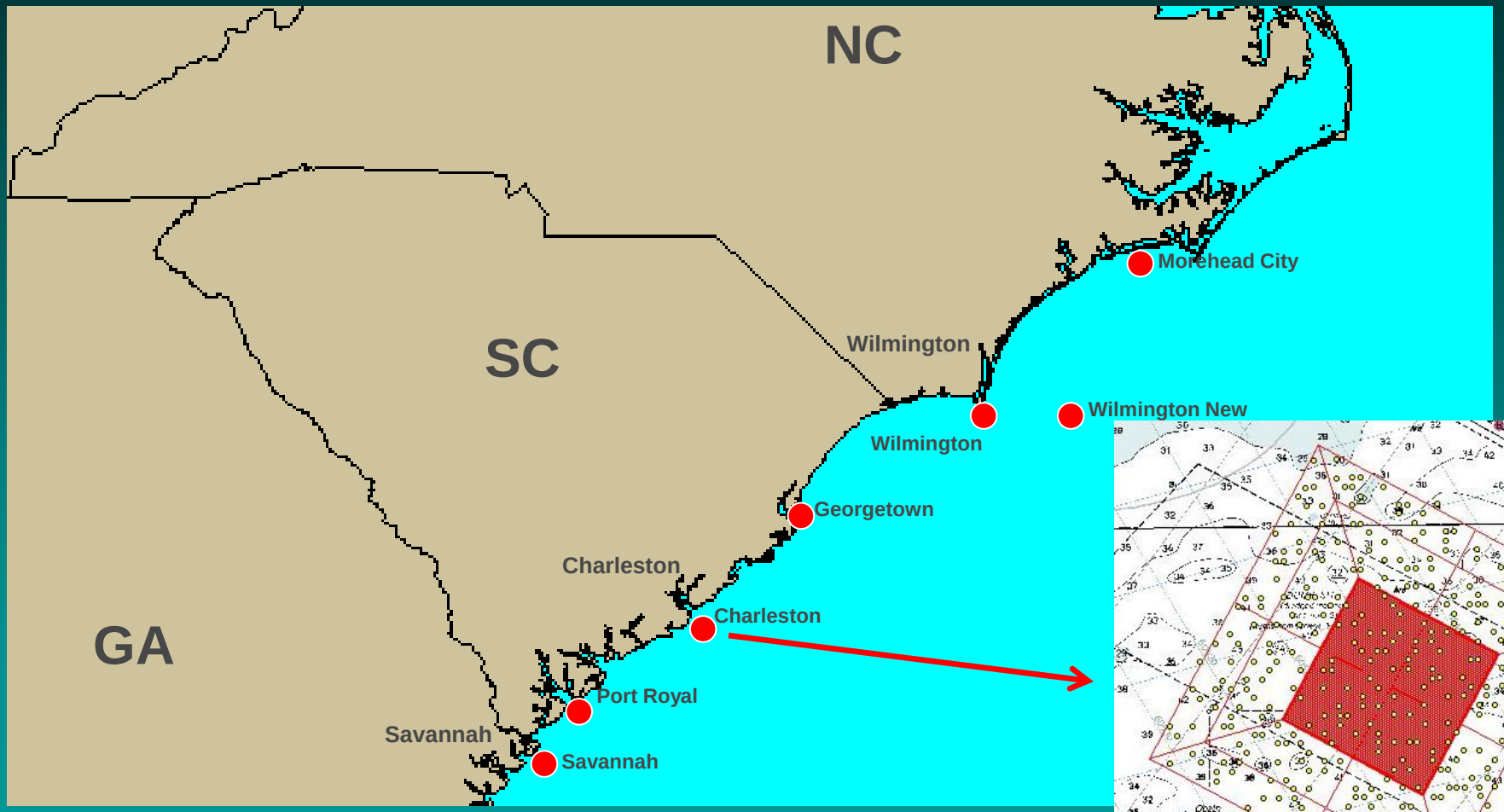


Need to identify best areas for use!!

SC Ocean Dredge Material Disposal Sites (ODMDS)



Nearshore Zone

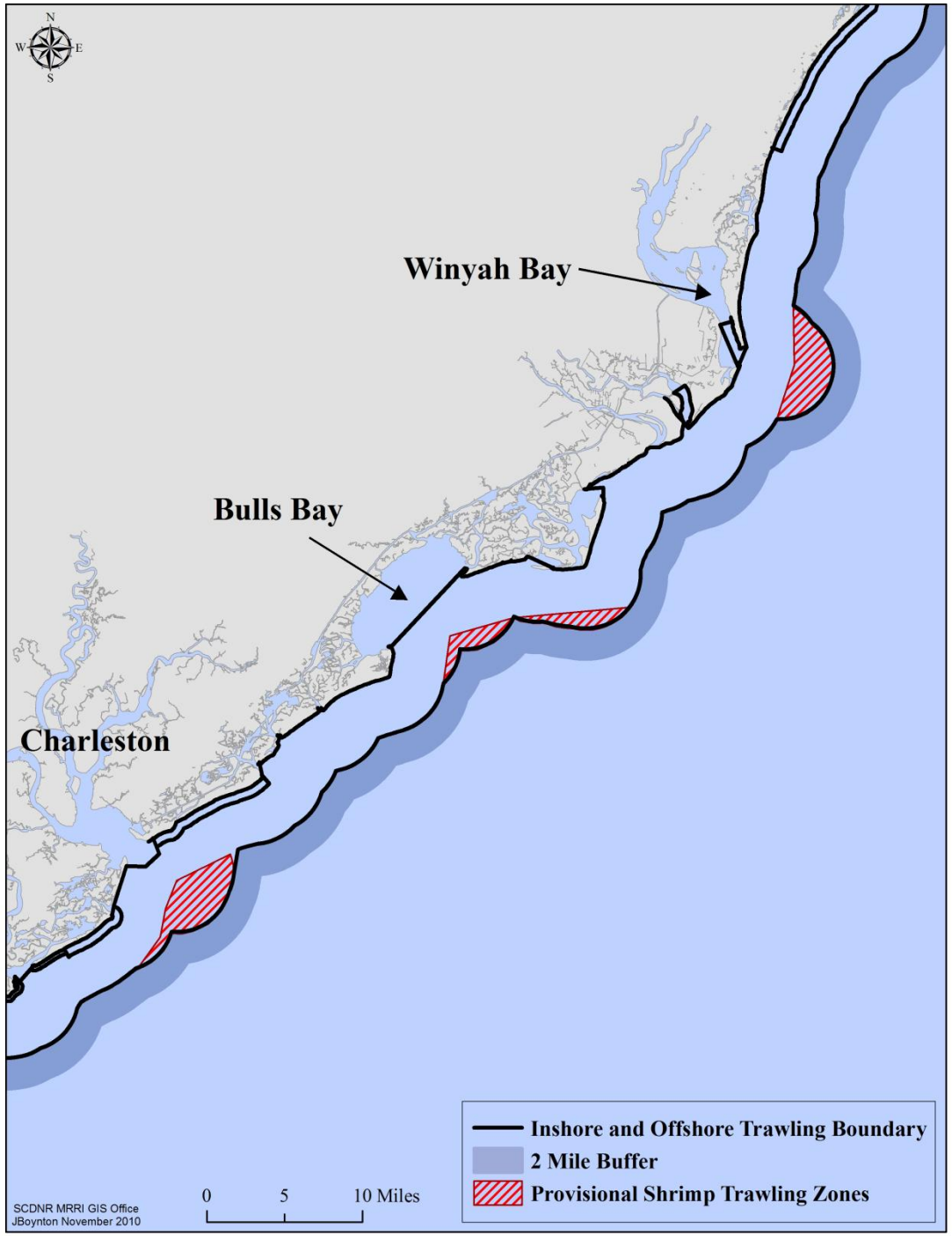
Commercial Fisheries

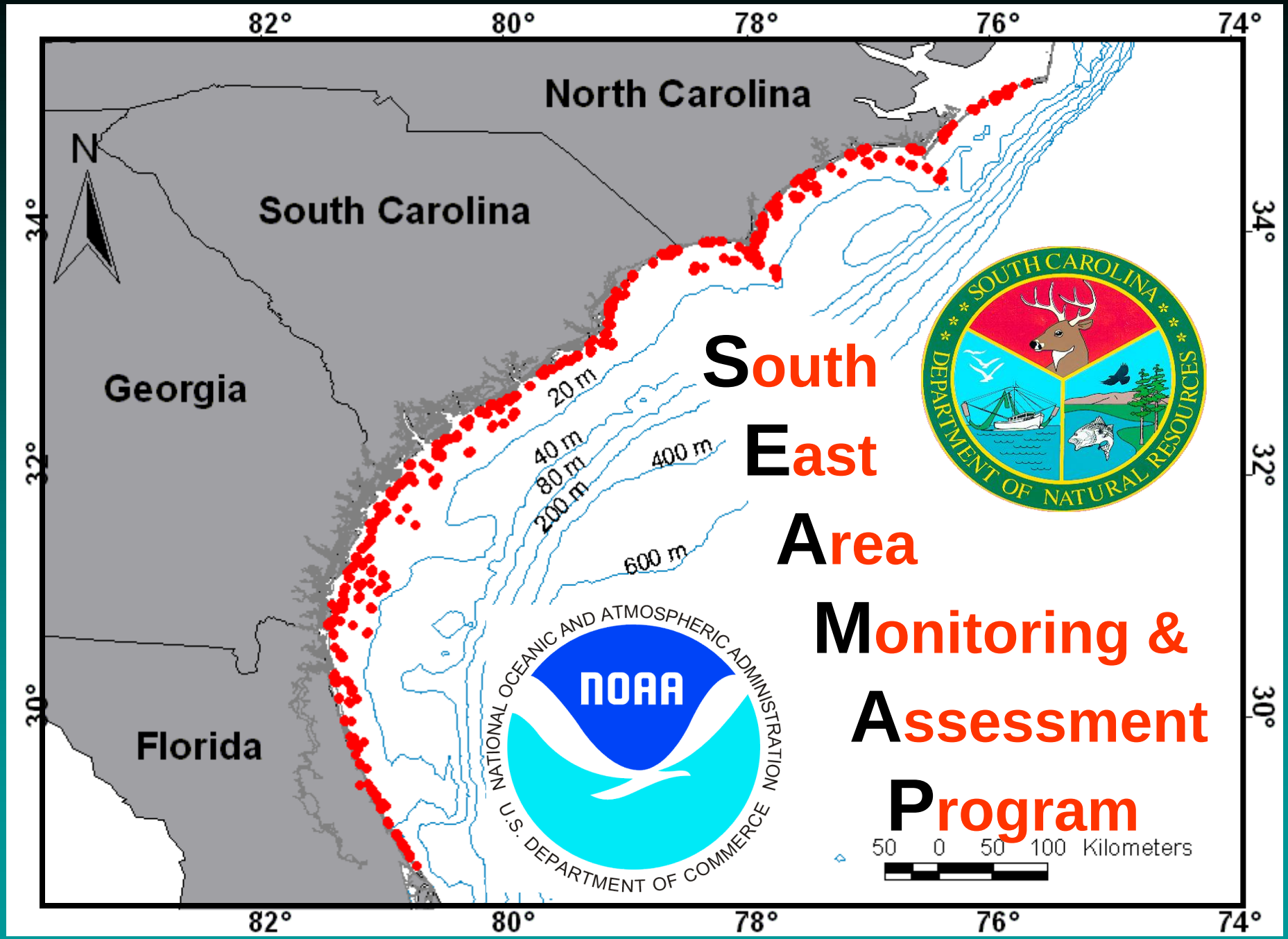
- **Primarily penaeid shrimp**
  - Some fishery for blue crab, whelk, other finfish

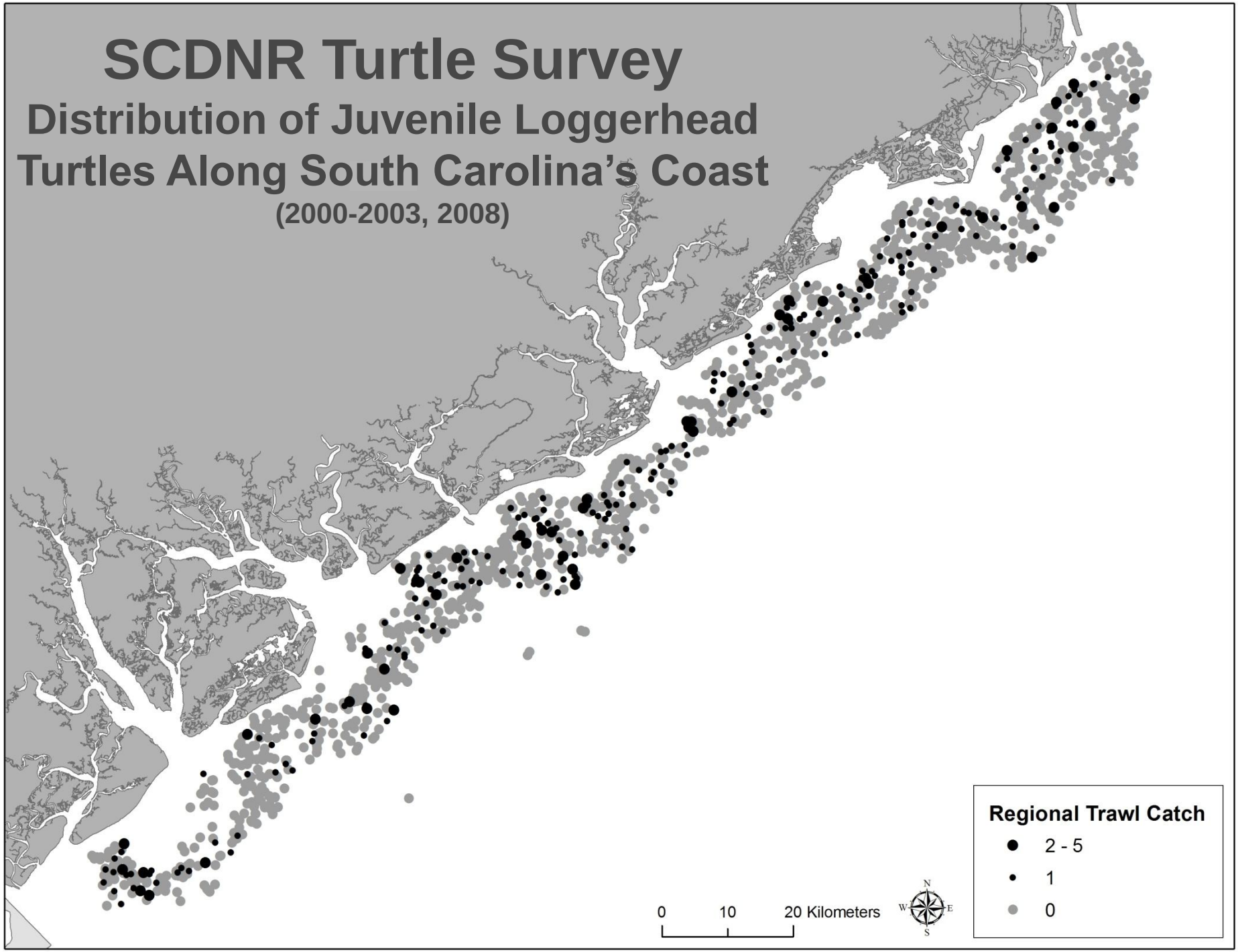
Recreational Fisheries

- **Several demersal and pel**
  - Many harvested in other reg
  - Many ecologically important

South Carolina Shrimp Trawl Fishery Zones



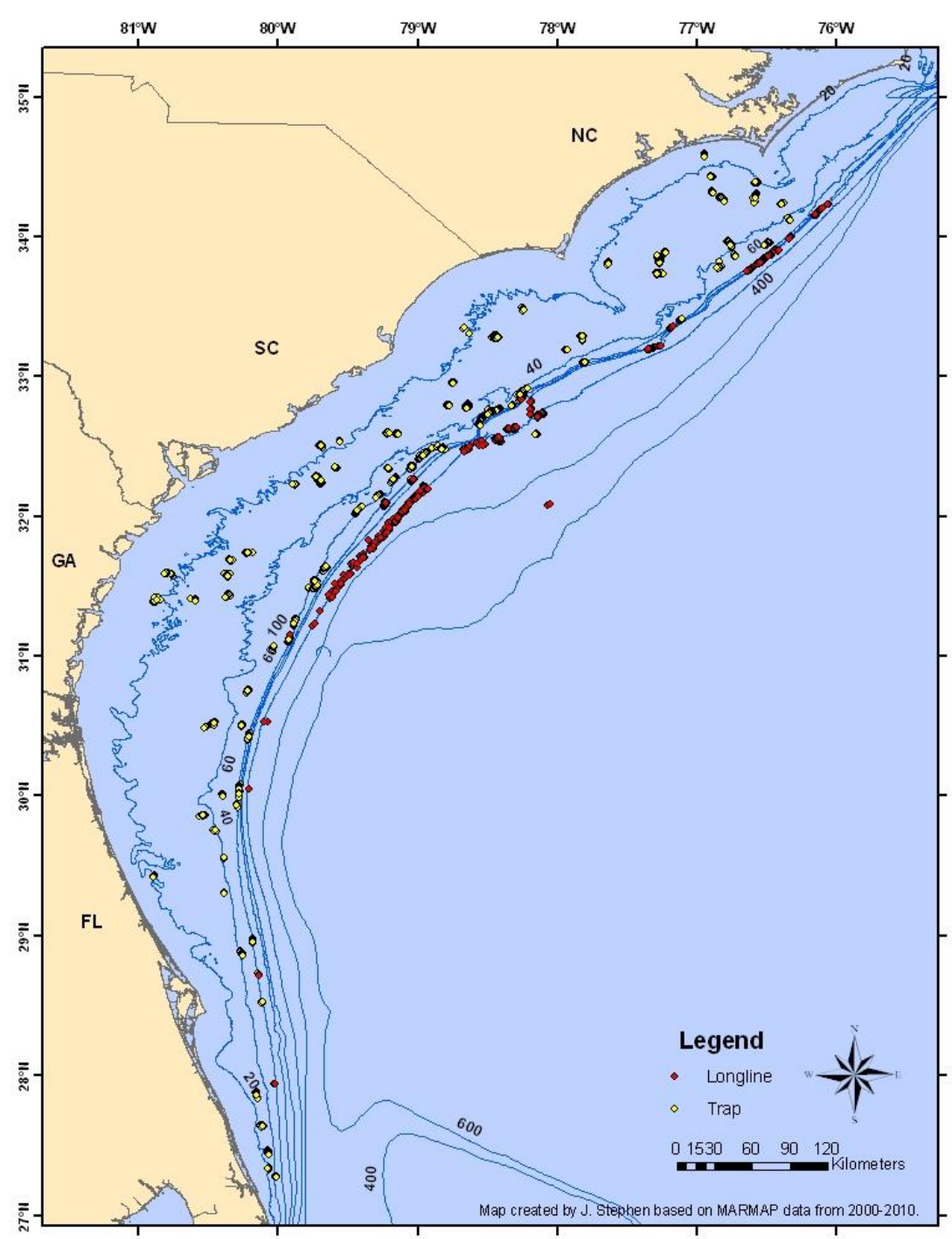

82°
80°
78°
76°
74°
34°
32°
30°
North Carolina
South Carolina
Georgia
Florida
N
20 m
40 m
80 m
200 m
400 m
600 m
South
East
Area
Monitoring &
Assessment
Program
SOUTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
50 0 50 100 Kilometers

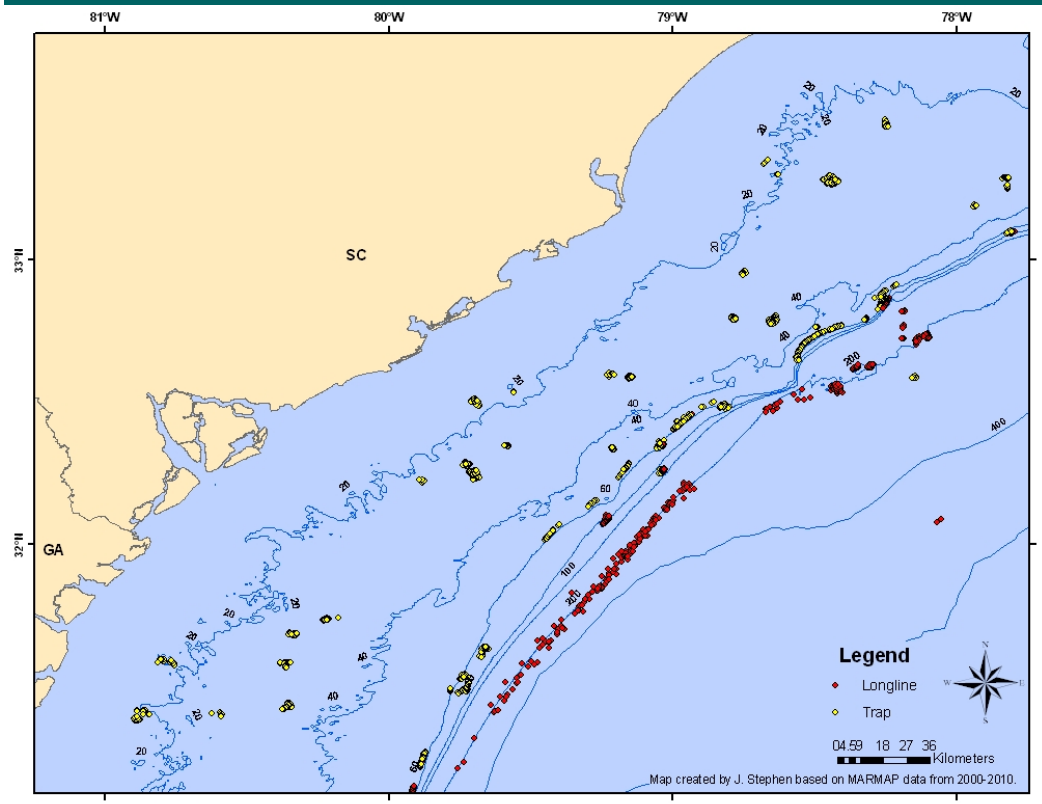

SCDNR Turtle Survey
Distribution of Juvenile Loggerhead Turtles Along South Carolina's Coast
(2000-2003, 2008)
Regional Trawl Catch
2 - 5
1
0
0
10
20 Kilometers
N
W
E
S

Hard Bottom Reef Habitats

Marine Resources Monitoring, Assessment, Prediction (MARMAP) Program

Distribution of sites sampled by trap and long-line from 2000 - 2010





Species in SAFMC Snapper-Grouper Complex Studied by MARMAP

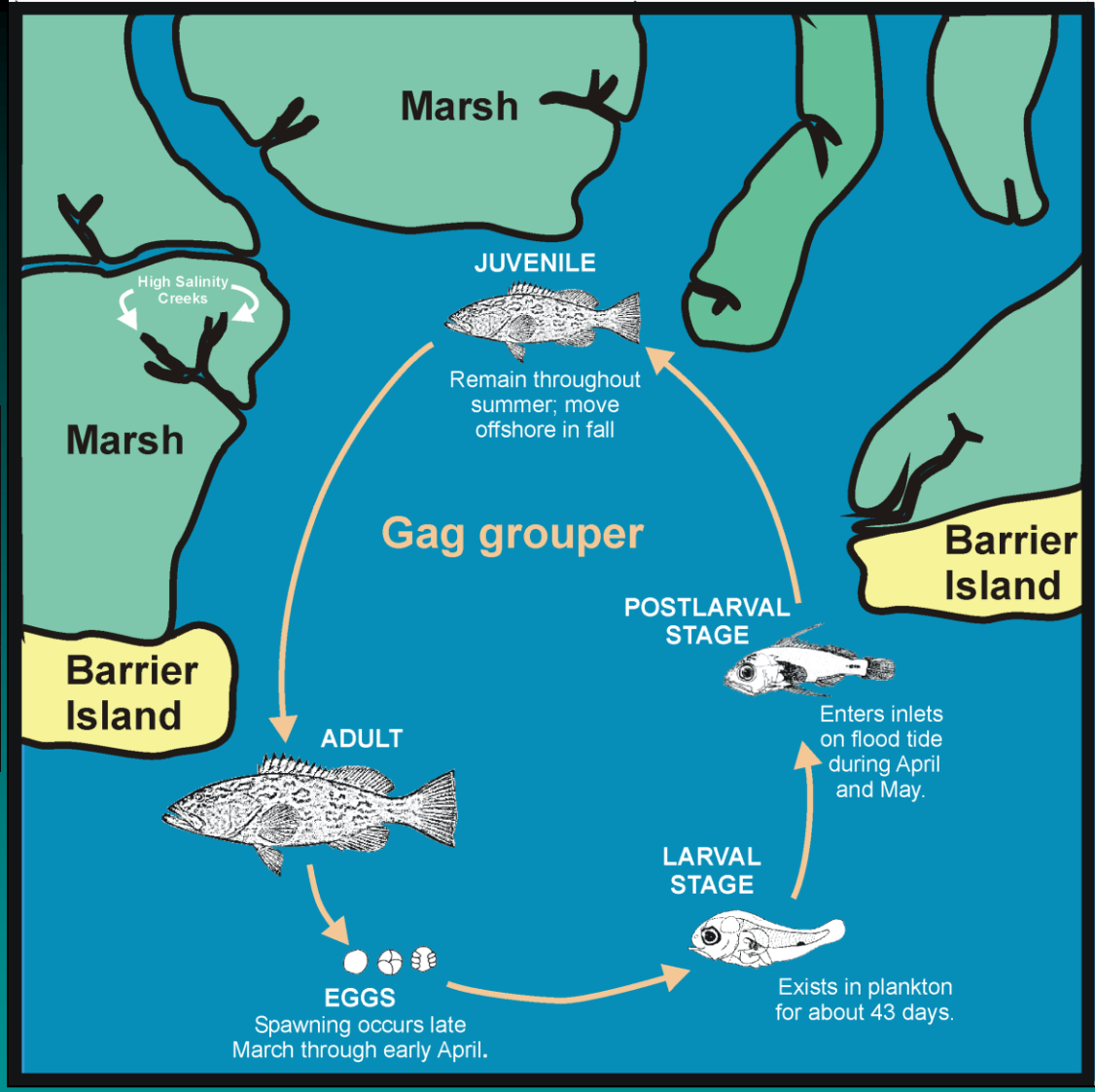
Vermilion snapper
Black Sea Bass
Red Grouper
Warsaw Grouper
Graysby
Wreckfish
Knobbed Porgy
Queen Triggerfish
Spadefish
Golden Tilefish

Red Snapper
Gag
Speckled Hind
Yellowedge Grouper
Coney
Red Porgy
Scup
Greater Amberjack
White Grunt
Sand Tilefish

Bank Sea Bass
Scamp
Snowy Grouper
Rock Hind
Red Hind
Whitebone Porgy
Gray Triggerfish
Tomtate
Blueline Tilefish
Hogfish

Gag Grouper

Reproductive Cycle



Need for Dredging Windows

Major Estuary Entrance Channel

Species	January		February		March		April		May		June		July		August		September		October		November		December	
	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
Crustaceans																								
Brown Shrimp																								
White Shrimp																								
Blue Crab																								
Finfish																								
Red Drum																								
Spotted Trout																								
Flounder																								
Shad																								
Shortnose Sturgeon																								
Atlantic Sturgeon																								
American Eel																								
Mollusks																								
Oysters																								
Hard Clams																								
Turtles																								
Loggerhead																								
Kemp's ridley																								
Green																								
Leatherback																								
OCRM Regs For Hopper Dredges																								

- little if any probability of occurrence
- low probability of occurrence
- moderate probability of occurrence
- high probability of occurrence

South Carolina's Mapping Efforts

Analysis of Historical Data

- NMFS SEAMAP Bottom Mapping Project
- MMS INTERMAR Bottom Mapping Project

Coastal Surveys

- Coastal Carolina / USGS Surveys
- Consulting Firm Surveys
- USACE Surveys

SEAMAP Bottom Mapping Project

Data Types

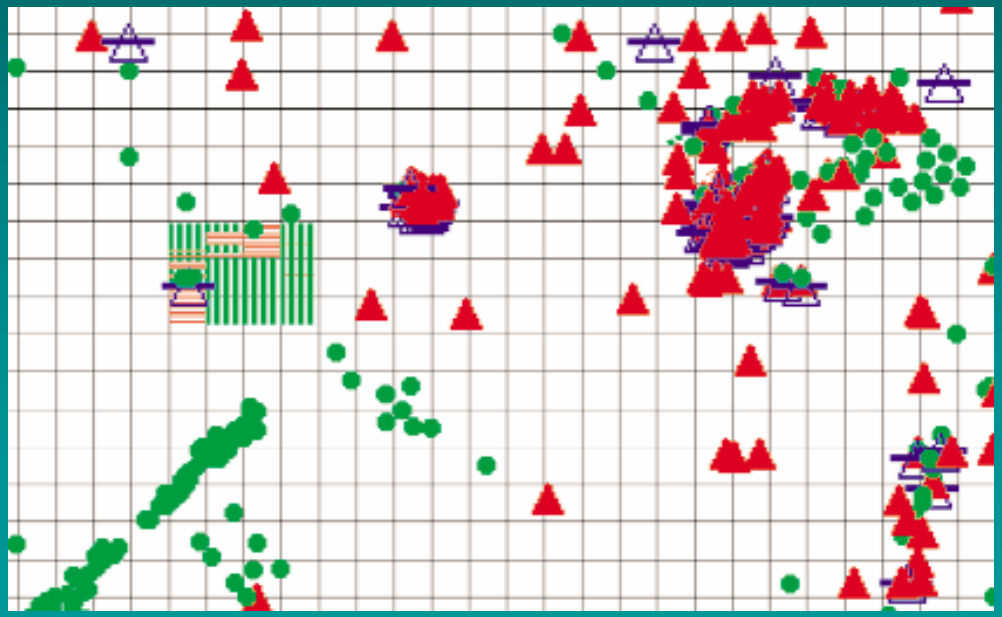
Scientific diver observations
Television and still camera records
Trawl data (based on reef obligate species)
Trap data (based on reef obligate species)
Dredge data (based on sessile reef species)
Side scan data (based on expert analyses)

Point data and continuous line data

SEAMAP Bottom Mapping Project

Database Structure

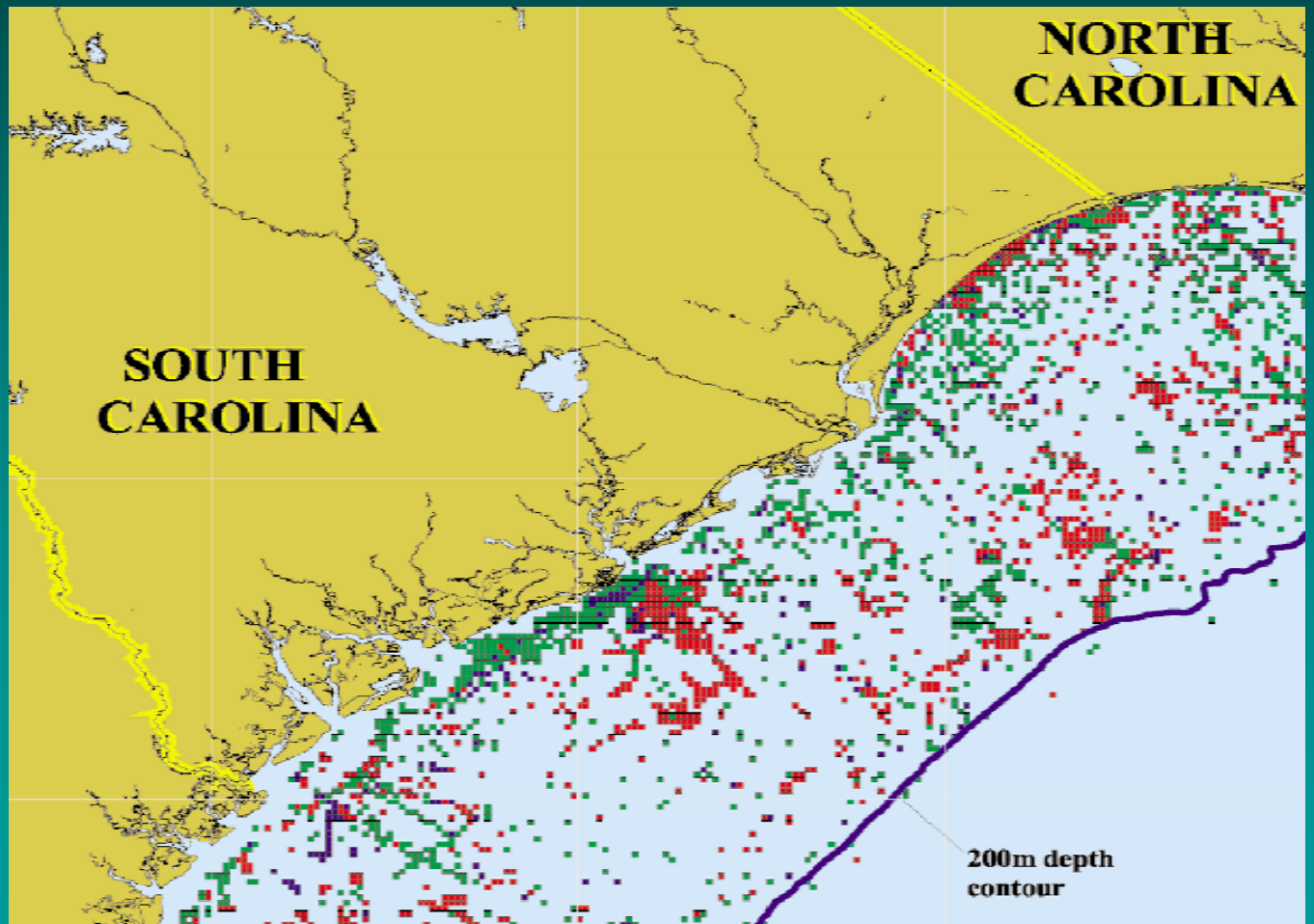
Block grid system (1 min. latitude, 1 min. longitude)
Continuous records separated by block boundaries



SEAMAP Bottom Mapping Project

Results

Over 65,700 records for SA, Over 11,500 records off SC



MMS INTERMAR Habitat/Sand Resource Data

Data Types

Location of hard bottom, sand bottom (from SEAMAP)

Data on sediment type and quality

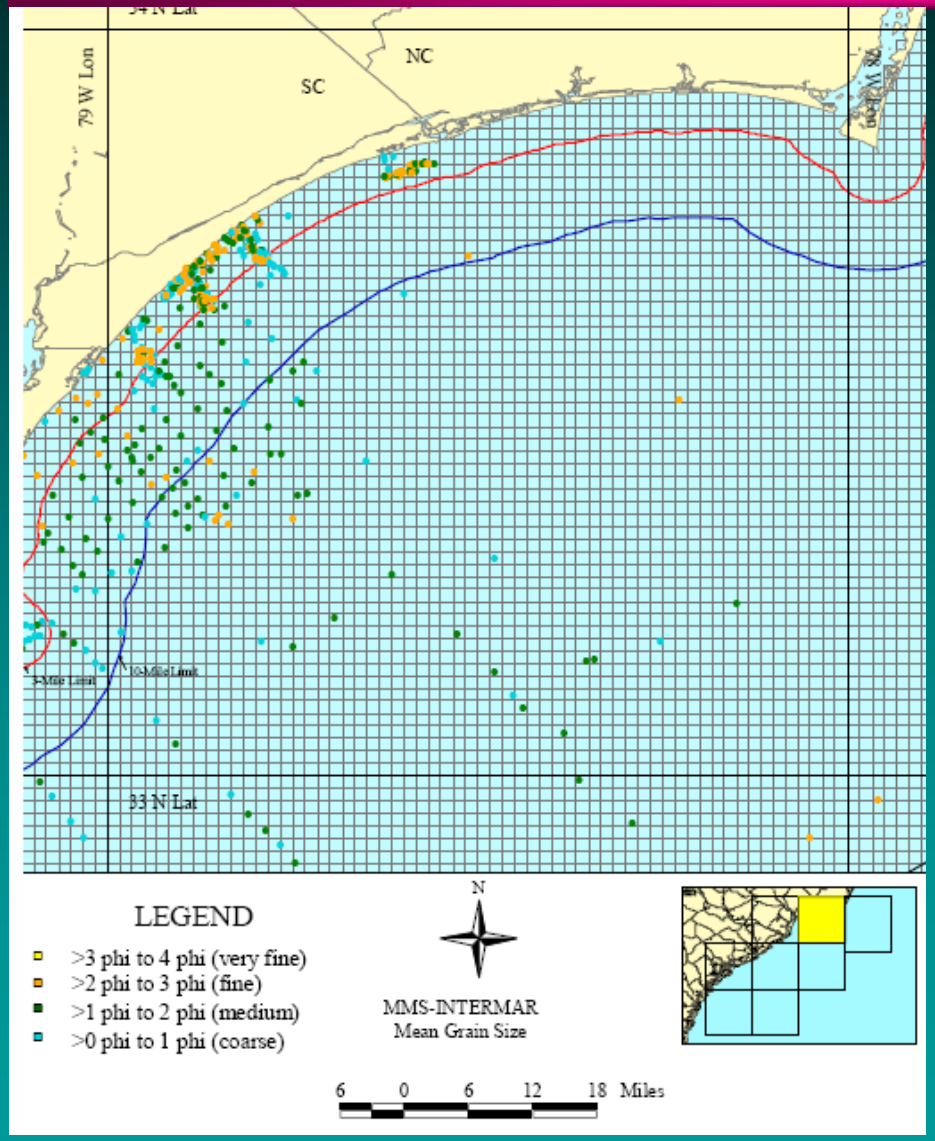
- Percent sand, silt, clay in the sediments
- Percent carbonate in the sediments
- Mean grain size
- Percent total heavy minerals in sample
- Percent phosphate in sample

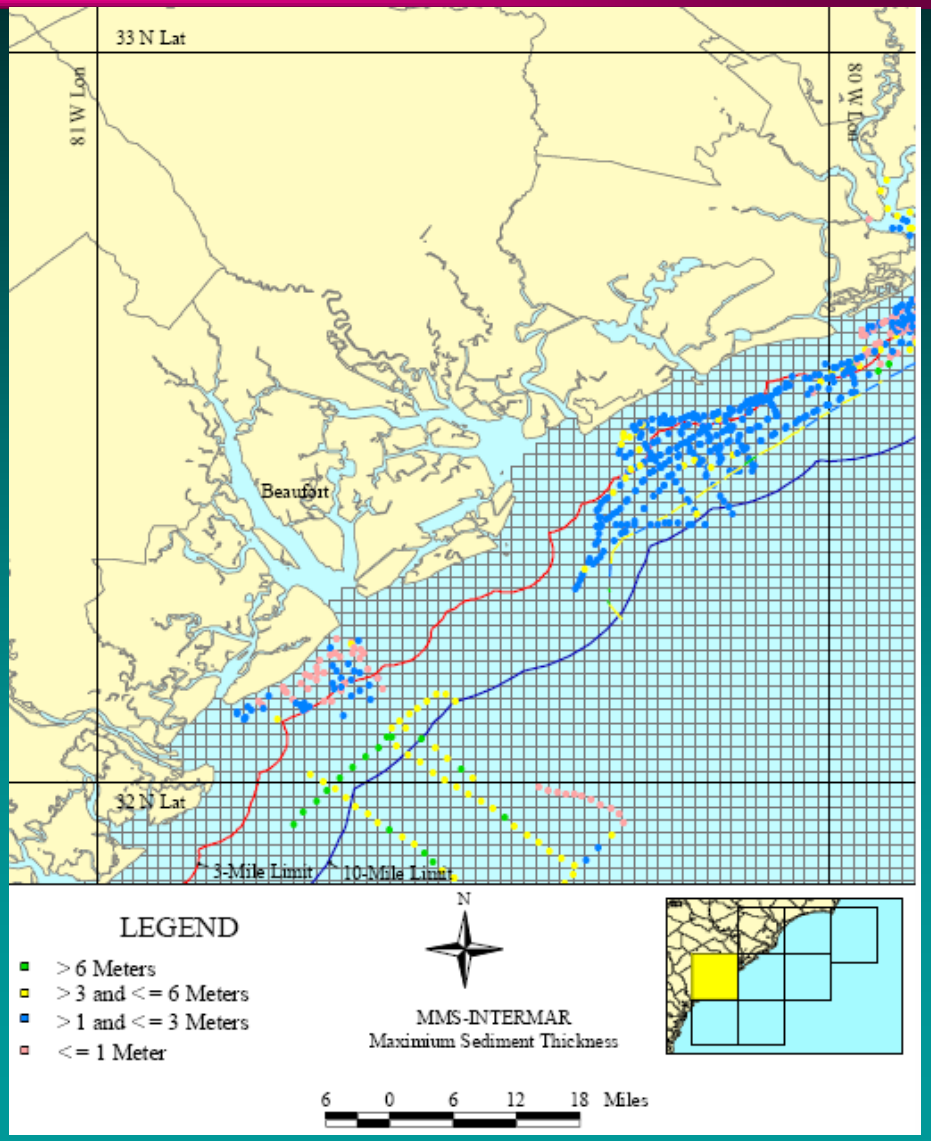
Data on sediment depth (seismic, vibracore data)

- Minimum and maximum depth of penetration at data point
- Minimum and maximum depth of sand lens at data point

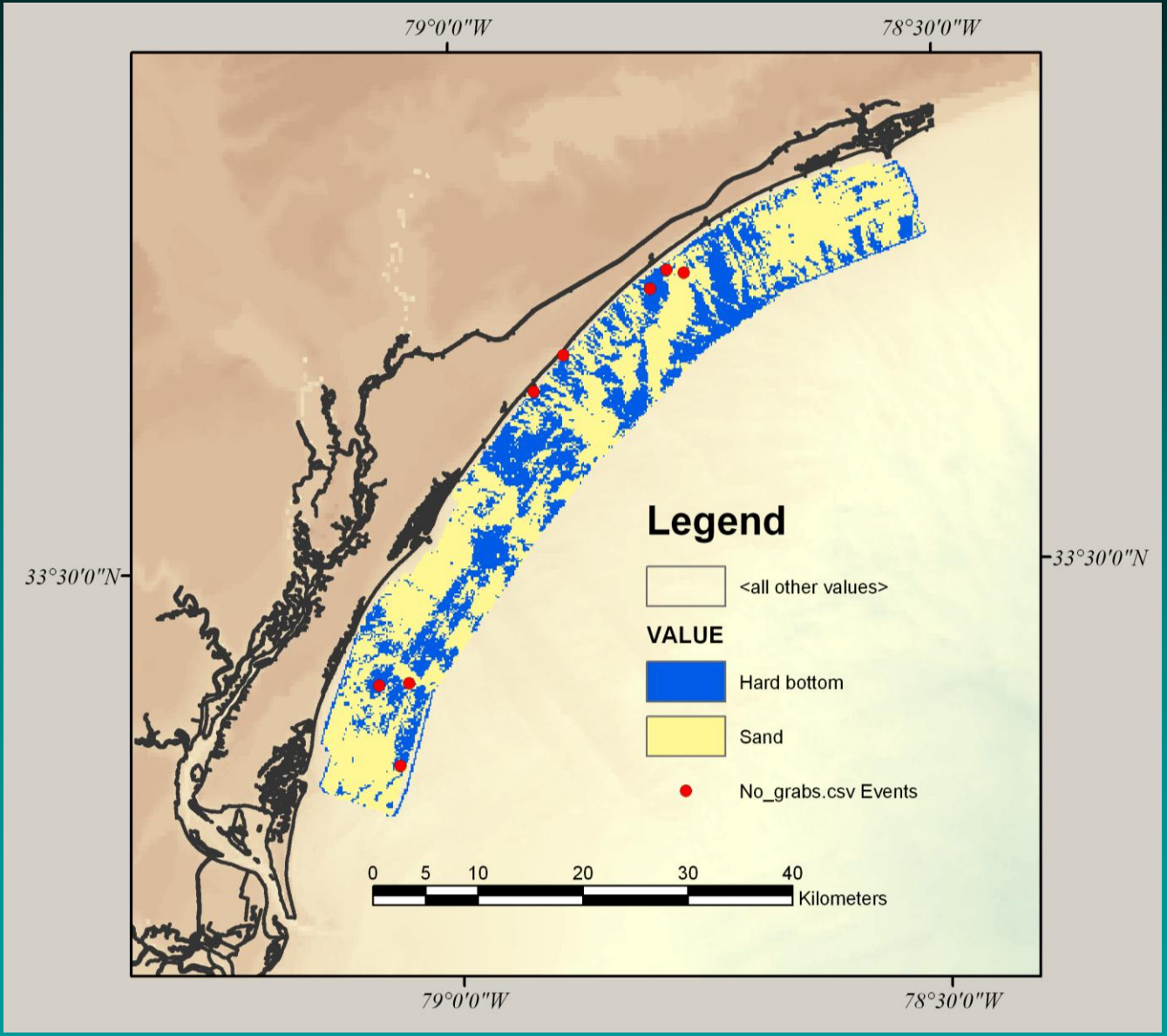
Point data (*continuous* line data evaluated at points)

MMS INTERMAR Habitat/Sand Resource Data





Coastal Carolina University Nearshore Mapping



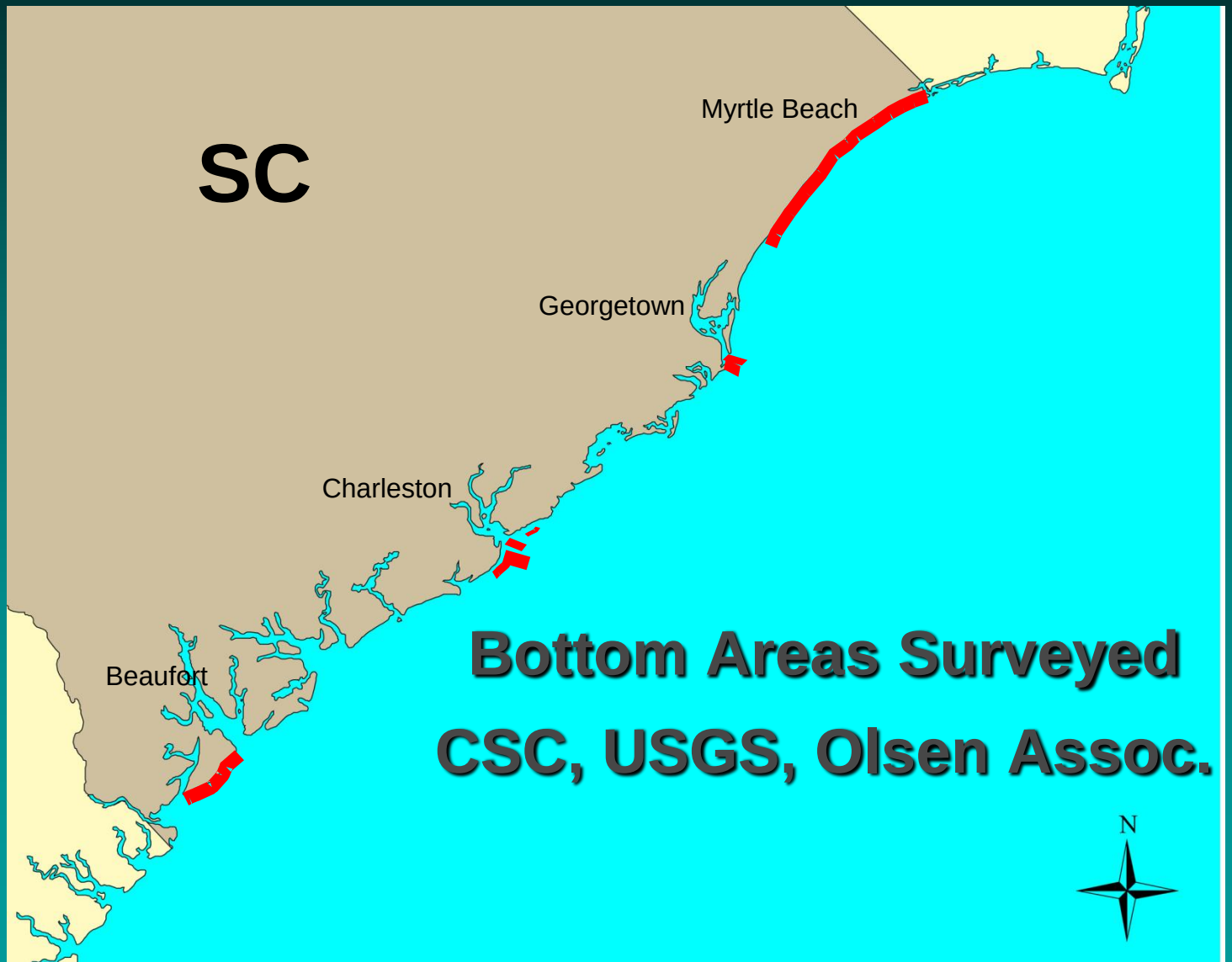
Total area: 686 km²

Hard bottom: 405 km² (59%)

Sand bottom: 281 km² (41%)

Data and graphics provided by Coastal Carolina University

Nearshore Zone Bottom Surveys



Summary of data layers to be developed for a Comprehensive GIS database

Dataset	Coverage	Priority
Biological Resources		
SC Live and Washed shell Oyster beds	statewide	high
Sea Turtle Nesting sites	statewide	high
Sea Turtle Distribution, coastal waters	**statewide**	**moderate**
Bird Nesting Sites	statewide	high
Bird Migration Routes	**?**	**?**
Bird Distribution	RPI, ?	?
Benthic Community Data	statewide	low
MARMAP survey, primary species	**statewide**	**moderate**
SEAMAP survey, primary species	**statewide**	**moderate**
Whale location sightings	**statewide**	**high**
Whale critical habitat map	**?**	
Protected Areas		
State, Federal, Privately Protected Lands	statewide	high
Marine Protected Areas	**statewide**	**high**
Shipwreck and ocean archeology resources	**statewide**	**high**
Imagery		
Imagery--1 meter 2009	statewide	
Elevation and Depth		
Bathymetric contours	**statewide**	**high**
Elevation--LIDAR	partial coastal	low
Flood Maps	statewide	low

Summary of data layers to be developed for a Comprehensive GIS database

Dataset	Coverage	Priority
Land		
Land Cover--C-CAP	statewide	low, age?
Wetlands--CSC-CCAP	statewide	High
Shoreline	statewide	low
Coastal Habitat		
Wind Resources WRF	**statewide**	**high**
Hydrography (rivers, streams)	statewide	moderate
Navigational Charts	statewide	high
INTERMAR (MMS) Bottom Mapping	**statewide**	**high**
SEAMAP Bottom Mapping	**statewide**	**high**
Nearshore bottom mapping data	**partial coastal**	**high**
Nearshore coring data	**?**	**high**
Artificial Reefs	**statewide**	**high**
Coastal Activities, Uses, Jurisdictions		
Marine boundaries (jurisdictions, etc)	**statewide**	**high**
Shipping Channels lanes and fairways	**statewide**	**high**
Disposal areas	**statewide**	**high**
Sand borrow sites	**statewide**	**high**
Shrimp trawling locations	**statewide**	**low**
Finfish harvest	**statewide**	**low**
Oyster Permit boundaries	statewide	high
Military flight and activity patterns	**statewide**	**high**
Military installations	statewide	high
Aviation Radar Sites	statewide	high
Navy training ranges	**statewide**	**high**
Marina, pier data layers	statewide	low
Electric grid (general) and sub stations?	statewide	high